ITT Transmission Division

A Division Of ITT Telecommunications Corporation

OPERATION-INSTALLATION-MAINTENANCE MANUAL

FOR

D448

PCM TRUNK CARRIER SYSTEM

PUBLICATION NO.
650059-823-001

ITT

2912 WAKE FOREST ROAD, RALEIGH, NORTH CAROLINA 27611 USA — TELEPHONE (919) 828-4441

NOTICE

This document describes the facilities, methods and performance of the D448 PCM Trunk Carrier System at the time of printing. The policy of ITT Telecommunications is to maintain continuous technical advancement and ITT Telecommunications reserves the right to make any necessary modifications therein.

WARNING

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions manual, may cause interference to radio communications. As temporarily permitted by regulation, it has not been tested for compliance with the limits for Class A computing devices pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference. Operation of this equipment in a residential area is likely to cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

Printed in U.S.A.

ITT Telecommunications Corporation

Transmission Division

2912 Wake Forest Road
Raleigh, North Carolina 27611
(919) 828-4441
Telex 579451

TO: All Holders of the ITT Telecommunications D448 PCM Trunk Carrier System (Operation-Installation-Maintenance) Manual, Publication Number 650059-823-001

FROM: Technical Publications Department, ITT Telecommunications, Raleigh, North Carolina

DATE: May, 1982

SUBJECT: Warnings for Static-Sensitive (MOS/CMOS/PMOS/NMOS) Devices

---

All ***WARNING***s pertaining to special handling of static-sensitive devices in the subject manual should be deleted. Due to high static sensitivity of early MOS-type ICs, this ***WARNING*** was included to ensure proper handling of ITT units equipped with such devices. However, it has since been discovered that such ***WARNING***s are no longer necessary and in fact do not correlate with statistics on unit failures. Therefore, all such ***WARNING***s should be deleted from existing documentation.

We regret any inconvenience this may have caused.

ITT Telecommunications Corporation

Transmission Division

2912 Wake Forest Road
Raleigh, North Carolina 27611
(919) 828-4441
Telex 579451

TO: All Holders of ITT D448 Carrier System Technical Manual

FROM: Technical Publications Department, ITT Telecommunications, Raleigh, North Carolina

DATE: April, 1982

SUBJECT: Transmit (TX) Level Setting on D448 Channel Units

TX LEVEL SWITCHES

1. Purpose: To "adjust" the input (TX) VF signal to the required level of the on-board, fixed-level input amplifier of the channel unit.

2. Method: Whole numbered switches (16, 8, 4, 2, 1), when ON, insert attenuation. These attenuators reduce a "hot" input signal to the level required by the transmit side of the channel unit. Decimal numbered (OWL) switches (.8, .4, .2, .1), when ON, remove attenuation in one-tenth dB steps (effectively add gain to the signal inside the channel unit).

3. Reference: See D448 Technical Manual Sections ITTR-18-440 (Page 2) and ITTR-18-441 (Page 2) for input level ranges that D448 channel units will accept.

4. Applications: Since different channel unit types have different fixed-level input amplifiers, the following example is only true for the following 4-wire channels; DX, TO, ETO, EVF, FXO, FXS and SF. However, the principle of channel unit level selection remains the same for all D448 channels.

EXAMPLE: INPUT (TX) SIGNAL RANGE: −23.5 to +9.0 dBm (the −23.5 includes 1.5 dB allowed by the OWL switches).

0 dBm0 LEVEL: −22.0 dBm with all switches OFF.

SAMPLE TX LEVEL SETTINGS

If Input Signal is	Set Switches		If Input Signal is	Set Switches	
	TX	OWL		TX	OWL
−23.5	none	.8, .4, .2, .1	−5.0	16, 1	none
−22.0	none	none	−2.0	16, 4	none
−21.0	1	none	0.0	16, 4, 2	none
−20.0	2	none	+2.0	16, 8	none
−19.0	1, 2	none	+2.5	16, 8	.4, .1
−18.0	4	none	+3.0	16, 8, 1	none
−17.0	1, 4	none	+5.0	16, 8, 2, 1	none
−16.5	1, 4	.4, .1	+8.0	16, 8, 4, 2	none
−16.0	2, 4	none	+9.0	16, 8, 4, 2, 1	none
THIS NUMBER	+ 22 =	THIS NUMBER	THIS NUMBER	+ 22 =	THIS NUMBER

SUMMARY: To find TX level setting for all D448 channel units, add 0 dBm0 number (+ and − signs ignored) to the actual level of the signal to be applied to the channel unit. The resulting number is the setting of the TX level and TX OWL switches.

D448 PCM TRUNK CARRIER SYSTEM

ADDENDUM

1. GENERAL

1.001 This addendum provides supplemental information for ITT Telecommunications D448 PCM Trunk Carrier System, Volume I (Operation-Installation-Maintenance Manual), Publication Number 650059-823-001. Place this pink sheet ahead of Section ITTR-18-000, D448 PCM Trunk Carrier System—Numerical Index.

1.002 This addendum had been issued to supplement the ITTR Sections listed below:

(a) Section ITTR-18-440, Trunk Channel Units—Option Selection and Installation

(b) Section ITTR-18-441, Special Service Channel Units—Option Selection and Installation

2. CHANGES TO SECTIONS

Note: Changed or added information has been indicated by a bar in the margin adjacent to the changed text.

2.001 In Section ITTR-18-440, insert enclosed Page 4A after Page 4.

2.002 In Section ITTR-18-441, replace Pages 3 and 4 with the enclosed Pages 3 and 4.

OPERATION-INSTALLATION-MAINTENANCE MANUAL

FOR

D448 PCM TRUNK CARRIER SYSTEM

NUMERICAL INDEX

1. GENERAL

1.01 This Section provides an index of issued Sections for this manual.

1.02 A bullet (●) indicates an item that has been changed or added since the previous index issue.

1.03 A canceled item is indicated by (x). Canceled items will be deleted upon the next reissue of the index.

1.04 "Add" is the abbreviation for Addendum; "Sup" is the abbreviation for Supplement.

	SECTION NUMBER	ISSUE	TITLE
			SYSTEM, SHELF AND COMMON EQUIPMENT GENERAL DESCRIPTION
●	ITTR-18-000	6	D448 PCM Trunk Carrier System -- Numerical Index
	Reference	3	D448 PCM Trunk Carrier System -- Reference Chart
	Introduction	3	D448 PCM Trunk Carrier System -- How To Use This Manual
	FCC Part 68	1	FCC Part 68 Instructions
	ITTR-18-001	3	D448 PCM Trunk Carrier System -- General Description
	ITTR-18-005	2	Connectorized Multiplex Shelf (MS/WC7, MS/WC5, MS/C6 and MS/C5), 628001, 628005, 628011 and 628015 (For 23-Inch Bays) -- General Description
	ITTR-18-006	2	Connectorized Multiplex Shelf (MS19/WC6, MS19/WC4, MS19/C6 and MS19/C5), 628003, 628008, 628013 and 628018 (For 19-Inch Bays) -- General Description

SECTION NUMBER	ISSUE	TITLE
ITTR-18-020	1	Transmit Logic Unit (TLU), 628020 -- General Description
ITTR-18-025	1	Receive Logic Unit (RLU), 628025 -- General Description
ITTR-18-030	2	Trunk Processor and Alarm (TPA) Unit, 628030 -- General Description
ITTR-18-035	2	Power Converter Unit (PCU), 628035 -- General Description
ITTR-18-045	2	Central Office Equalizer (EQL), 628045 -- General Description
ITTR-18-050	1	Line Interface, Mode 1 (LI-1), 628050 -- General Description
ITTR-18-055	1	Line Interface, Mode 2 (LI-2), 628055 -- General Description
ITTR-18-060	1	Line Interface, Mode 3 (LI-3), 628060 -- General Description
ITTR-18-075	1	Cut-Thru Unit (CTU), 628075 -- General Description
ITTR-18-090	1	Office Interface Unit for Loop Timing (OIU/LT), 628090 -- General Description
ITTR-18-091	1	Office Interface Unit for Loop Timing, Separate Digroups (OIU/LTS), 628091 -- General Description
ITTR-18-095	1	Office Interface Unit for DDS (OIU/DDS), 628095 -- General Description
ITTR-18-096	1	Office Interface Unit for DDS, Separate Digroups (OIU/DDSS), 628096 -- General Description
		TRUNK CHANNEL UNIT GENERAL DESCRIPTION
ITTR-18-100	2	4-Wire E&M (4WEM) Channel Unit, 628100 and 628101 -- General Description
ITTR-18-120	2	2-Wire E&M (2WEM9 and 2WEM6) Channel Unit, 628120 -- General Description

SECTION NUMBER	ISSUE	TITLE
ITTR-18-121	1	2-Wire E&M With Ground (2WEMG9 and 2WEMG6) Channel Unit, 628121 -- General Description
ITTR-18-130	2	2-Wire E&M With A and B Leads (2WEM9A and 2WEM6A) Channel Unit, 628130 and 628131 -- General Description
ITTR-18-140	2	2-Wire Dial Pulse Originating (DPO9 and DPO6) Channel Unit, 628140 -- General Description
ITTR-18-150	2	3-Wire Dial Pulse Originating (SDPO9 and SDPO6) Channel Unit, 628150 -- General Description
ITTR-18-155	1	3-Wire Dial Pulse Originating With Calling Party Forced Release (SDPOC9 and SDPOC6) Channel Unit, 628155 -- General Description
ITTR-18-156	1	NX-1E/D9 and NX-1E/D6 Channel Unit, 628156 -- General Description
ITTR-18-160	2	2-Wire Dial Pulse Terminating (DPT9 and DPT6) Channel Unit, 628160 and 628162 -- General Description
ITTR-18-170	2	2-Wire Dial Pulse Terminating With Integrity Check (DPT9I and DPT6I) Channel Unit, 628170 and 628171 -- General Description
ITTR-18-180	2	2-Wire Foreign Exchange Office (2WFXO9 and 2WFXO6) Channel Unit, 628180, and 2-Wire Foreign Exchange Office With Loop Start (2WFXO/LS9 and 2WFXO/LS6) Channel Unit, 628184 -- General Description
ITTR-18-185	1	2-Wire Foreign Exchange Office Special (2WFXO9/SP and 2WFXO6/SP) Channel Unit, 628185 -- General Description
ITTR-18-190	3	2-Wire Foreign Exchange Subscriber (2WFXS9 and 2WFXS6) Channel Unit, 628190, and 2-Wire Foreign Exchange Subscriber With Extended VF Range (2WFXS/EVF) Channel Unit, 628192 -- General Description

SECTION NUMBER	ISSUE	TITLE
		SPECIAL SERVICE CHANNEL UNIT GENERAL DESCRIPTION
ITTR-18-200	2	4-Wire Transmission Only (4WTO) Channel Unit, 628200, and 4-Wire Transmission Only for Use with External SF Signaling (4WTO/SF) Channel Unit, 628205 -- General Description
ITTR-18-210	1	4-Wire Equalized Transmission Only (4WETO) Channel Unit, 628210 -- General Description
ITTR-18-220	2	4-Wire Pulse Link Repeater (4WPLR) Channel Unit, 628220 -- General Description
ITTR-18-230	1	4-Wire Foreign Exchange Office With VF Response Equalizer (4WFXO/VF) Channel Unit, 628230, and 4-Wire Foreign Exchange Office (4WFXO) Channel Unit, 628235 -- General Description
ITTR-18-240	1	4-Wire Foreign Exchange Subscriber With VF Response Equalizer (4WFXS/VF) Channel Unit, 628240, and 4-Wire Foreign Exchange Subscriber (4WFXS) Channel Unit, 628245 -- General Description
ITTR-18-250	1	4-Wire E&M Dual (4WEMD) Channel Unit, 628250 -- General Description
ITTR-18-255	1	ETS-4 Channel Unit, 628255 -- General Description
ITTR-18-260	1	4-Wire Tandem (4WTDM) Channel Unit, 628260 -- General Description
ITTR-18-270	1	4-Wire Extended Voice Frequency (4WEVF) Channel Unit, 628270 -- General Description
ITTR-18-275	1	4-Wire Single Frequency (4WSF) Channel Unit, 628275 -- General Description
• Add ITTR-18-278	1	4-Wire Single Frequency/Foreign Exchange (4WSF/FX) Channel Unit, 628278 -- General Description
ITTR-18-280	1	4-Wire Duplex With VF Response Equalizer (4WDX/VF) Channel Unit, 628280, and 4-Wire Duplex (4WDX) Channel Unit, 628285 -- General Description

SECTION NUMBER	ISSUE	TITLE
ITTR-18-290	1	2-Wire Duplex (2WDX) Channel Unit, 628290 -- General Description
ITTR-18-295	1	2-Wire Private Line Automatic Ringdown (2WPLAR) Channel Unit, 628295 -- General Description
ITTR-18-300	1	2-Wire Single Party Central Office (SPCO) Channel Unit, 628300 -- General Description
ITTR-18-305	1	2-Wire Single Party Subscriber (SPS) Channel Unit, 628305 -- General Description
ITTR-18-310	1	Alarm Channel Unit (ACU), 628310 -- General Description
		DATAPORT AND PROGRAM CHANNEL UNIT GENERAL DESCRIPTION
ITTR-18-340	1	DS-0 Rate Dataport (DS0DP), 628340 and 628342 -- General Description
ITTR-18-350	1	Office Channel Unit Dataport (OCUDP), 628350, 628352, 628354 and 628356 -- General Description
ITTR-18-360	1	Program Channel Units -- General Description
		INSTALLATION AND TESTING
ITTR-18-400	1	D448 PCM Trunk Carrier System -- Installation and Testing Considerations
ITTR-18-404	2	Prewired Bays (23-Inch) -- Option Selection, Installation and Pretest
ITTR-18-405	3	Connectorized Multiplex Shelf (MS/WC7, MS/WC5, MS/C6 and MS/C5), 628001, 628005, 628011 and 628015 (For 23-Inch Bays) -- Option Selection, Installation and Pretest
ITTR-18-406	2	Connectorized Multiplex Shelf (MS19/WC6, MS19/WC4, MS19/C6 and MS19/C5), 628003, 628008, 628013 and 628018 (For 19-Inch Bays) -- Option Selection, Installation and Pretest

	SECTION NUMBER	ISSUE	TITLE
	ITTR-18-414	1	Prewired Bays (19-Inch) -- Option Selection, Installation and Pretest
	ITTR-15-323/ ITTR-18-423	2	Communications Panel, 623323 and 623324 -- Installation and Test
	ITTR-18-431	3	Mode 1 Common Equipment -- Installation and Pretest
	ITTR-18-432	3	Mode 2 Common Equipment -- Installation and Pretest
	ITTR-18-433	3	Mode 3 Common Equipment -- Installation and Pretest
	ITTR-18-440	3	Trunk Channel Units -- Option Selection and Installation
• Add	ITTR-18-441	2	Special Service Channel Units -- Option Selection and Installation
	ITTR-18-442	1	Dataport Channel Units -- Option Selection and Installation
	ITTR-18-443	3	Channel Units -- Single-Ended Transmission Tests
	ITTR-18-445	3	Channel Units -- End-to-End Transmission Tests
	ITTR-18-447	3	Channel Units -- End-to-End Signaling Tests
	ITTR-18-451	1	Dataport Channel Units -- Preservice Testing
	ITTR-18-460	1	Program Channel Units -- Option Selection, Installation, Installation Tests and Trouble Location
	ITTR-18-470	A	Dataport Digital Service -- Local Loop Acceptance Testing
	ITTR-18-490	3	Fuse, Alarm and Distribution Panel (FADP), 628490 -- Option Selection, Installation and Pretest
	ITTR-18-491	2	Fuse, Alarm and Distribution Panel (FADP), 628492 -- Installation and Pretest

SECTION NUMBER	ISSUE	TITLE
		MAINTENANCE AND TROUBLE LOCATION
ITTR-18-500	A	D448 PCM Trunk Carrier System -- Maintenance Considerations
ITTR-18-531	2	Mode 1 Alarm Trouble Location
ITTR-18-532	2	Mode 2 Alarm Trouble Location
ITTR-18-533	2	Mode 3 Alarm Trouble Location
ITTR-18-543	2	Non-Alarm Transmission and Signaling Trouble Location
ITTR-18-550	1	Dataport Trouble Location
ITTR-18-599	2	D448 PCM Trunk Carrier System -- Disposition of Defective Units
		TEST EQUIPMENT GENERAL DESCRIPTION
ITTR-18-600	4	D448 PCM Trunk Carrier System -- Recommended Test Equipment
ITTR-15-129/ ITTR-18-629	1	VF Jack Panel, 623129 -- General Description
ITTR-18-650	2	Automated Test and Alignment Unit (ATAU), 628450 -- General Description
ITTR-18-655	1	Test Interface (TIU), 628455 -- General Description
ITTR-18-658	1	Data Test Interface (DTI), 628458 -- General Description
ITTR-18-660	1	Channel Extender Unit (CEU), 628460 and 628462 -- General Description
ITTR-18-670	1	Channel Unit Splitting Jack/310 Adapter Cord, 600397-540-003; VF Monitor Plug, 600397-540-005; Contact Breaking Plug (Dummy Plug), 600134-611-001 -- General Description

SECTION NUMBER	ISSUE	TITLE
		APPLICATIONS AND ENGINEERING
ITTR-18-700	1	D448 PCM Trunk Carrier System -- Dataport Application and Design Considerations
		MISCELLANEOUS EQUIPMENT GENERAL DESCRIPTION
ITTR-18-804	2	Prewired Bays (23-Inch) -- General Description
ITTR-18-814	2	Prewired Bays (19-Inch) -- General Description
ITTR-15-023/ ITTR-18-823	2	Communications Panel, 623323 -- General Description
ITTR-15-024/ ITTR-18-824	1	Communications Panel, 623324 -- General Description
ITTR-18-890	2	Fuse, Alarm and Distribution Panel (FADP), 628490 -- General Description
ITTR-18-892	1	Fuse, Alarm and Distribution Panel (FADP), 628492 -- General Description

D448 PCM TRUNK CARRIER SYSTEM

REFERENCE CHART

Use this chart as a part number-to-general description quick reference. Related information on the unit (option selection, installation, etc.) is listed at the end of the general description Section. Section number in **bold** is used in this manual.

PART NO.	MNEMONIC	SECTION NO.
623323	—	ITTR-15-023/ ITTR-18-**823**
623324	—	ITTR-15-023/ ITTR-18-**823**
628001	MS/WC7	ITTR-18-**005**
628003	MS19/WC7	ITTR-18-**006**
628005	MS/WC5	ITTR-18-**005**
628008	MS19/WC5	ITTR-18-**006**
628011	MS/C7	ITTR-18-**005**
628013	MS19/C7	ITTR-18-**006**
628015	MS/C6	ITTR-18-**005**
628018	MS19/C6	ITTR-18-**006**
628020	TLU	ITTR-18-**020**
628025	RLU	ITTR-18-**025**
628030	TPA	ITTR-18-**030**
628035	PCU	ITTR-18-**035**
628045	EQL	ITTR-18-**045**
628050	LI-1	ITTR-18-**050**
628055	LI-2	ITTR-18-**055**
628060	LI-3	ITTR-18-**060**
628075	CTU	ITTR-18-**075**
628090	OIU/LT	ITTR-18-**090**
628095	OIU/DDS	ITTR-18-**095**
628100	4WEM	ITTR-18-**100**
628120	2WEM9, 2WEM6	ITTR-18-**120**
628121	2WEMG9, 2WEMG6	ITTR-18-**121**
628130	2WEM9A, 2WEM6A	ITTR-18-**130**
628140	DPO9, DPO6	ITTR-18-**140**
628150	SDPO9, SDPO6	ITTR-18-**150**
628155	SDPOC9, SDPOC6	ITTR-18-**155**
628156	NX-1E/D9, NX-1E/D6	ITTR-18-**156**
628160	DPT9, DPT6	ITTR-18-**160**
628170	DPT9I, DPT6I	ITTR-18-**170**
628180	2WFXO9, 2WFXO6	ITTR-18-**180**
628184	2WFXO/LS9, 2WFXO/LS6	ITTR-18-**180**
628190	2WFXS9, 2WFXS6	ITTR-18-**190**
628192	2WFXS/EVF	ITTR-18-**190**
628200	4WTO	ITTR-18-**200**
628205	4WTO/SF	ITTR-18-**200**
628210	4WETO	ITTR-18-**210**
628220	4WPLR	ITTR-18-**220**
628230	4WFXO/VF	ITTR-18-**230**
628235	4WFXO	ITTR-18-**230**
628240	4WFXS/VF	ITTR-18-**240**
628245	4WFXS	ITTR-18-**240**
628255	ETS-4	ITTR-18-**255**
628260	4WTDM	ITTR-18-**260**

PART NO.	MNEMONIC	SECTION NO.
628270	4WEVF	ITTR-18-270
628275	4WSF	ITTR-18-275
628280	4WDX/VF	ITTR-18-280
628285	4WDX	ITTR-18-280
628290	2WDX	ITTR-18-290
628295	2WPLAR	ITTR-18-295
628320	PGCU5T	ITTR-18-360
628322	PGCU8T	ITTR-18-360
628330	PGCU5R	ITTR-18-360
628332	PGCU8R	ITTR-18-360
628340	DS0DP	ITTR-18-340
628342	DS0DP	ITTR-18-340
628350	OCUDP/2.4K	ITTR-18-350
628352	OCUDP/4.8K	ITTR-18-350
628354	OCUDP/9.6K	ITTR-18-350
628356-000-001 -003	OCUDP/56K	ITTR-18-350
628356-000-004 -006	OCUDP/56KE	ITTR-18-305
628450	ATAU	ITTR-18-650
628455	TIU	ITTR-18-655
628458	DTI	ITTR-18-658
628460	CEU	ITTR-18-660
628462	CEU	ITTR-18-660
628490	FADP	ITTR-18-890
628492	FADP	ITTR-18-892

D448 PCM TRUNK CARRIER SYSTEM

HOW TO USE THIS MANUAL

1. GENERAL

1.01 This document contains information which assists the user in finding material in this manual by describing the arrangement of the manual and the types and levels of information presented in it. This manual is the primary source of user information for the operation, installation, and maintenance of the ITT D448 PCM trunk carrier system.

2. ARRANGEMENT AND SCOPE

2.01 Each Section in this manual is identified by an ITT Raleigh (ITTR) 5-digit number (for example, ITTR-18-XXX). The -18- in the number identifies the Sections as applying to the D448 PCM trunk carrier system. The -XXX identifies individual Sections.

2.02 This manual is divided into nine major parts, as described in Table A and the following paragraphs.

2.03 General description Sections (ITTR-18-0XX, ITTR-18-1XX, ITTR-18-2XX, ITTR-18-3XX, ITTR-18-6XX, and ITTR-18-8XX) provide physical description, functional operation, and technical specifications for the subject equipment. Whenever feasible, the equipment is described to a simplified block diagram level. The Sections are designed to provide the user with a working knowledge of the equipment for system planning, trouble location, and other requirements.

2.04 Installation and testing Sections (ITTR-18-4XX) cover installation for prewired bays, shelves, and plug-in units; option selection for shelves and plug-in units; preservice tests for prewired bays, shelves, and common equipment; and transmission tests (single-ended and end-to-end) for channel units.

2.05 Maintenance and trouble location Sections (ITTR-18-5XX) provide maintenance information, alarm trouble location procedures, and non-alarm transmission and signaling trouble location procedures. Information on trouble location is presented in Task Oriented Practice System (TOPS) type diagrams.

2.06 Applications and engineering considerations Sections (ITTR-18-7XX) provide applications and engineering information on dataport channel units and associated local loop facilities.

TABLE A

PART	CONTENTS
ITTR-18-0XX	System, shelf, and common equipment general descriptions
ITTR-18-1XX	Trunk channel unit general descriptions
ITTR-18-2XX	Special service channel unit general descriptions
ITTR-18-3XX	Dataport and program channel unit general descriptions
ITTR-18-4XX	Installation and testing
ITTR-18-5XX	Maintenance and trouble location
ITTR-18-6XX	Test equipment general descriptions
ITTR-18-7XX	Applications and engineering
ITTR-18-8XX	Miscellaneous equipment general descriptions